

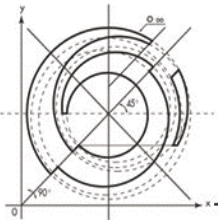


July 24, 2001

# Ultra-Low NOx Integrated System for Coal Fired Power Plants

Galen H. Richards

**ALSTOM**

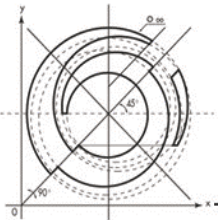


# Combustion Testing in the Boiler Simulation Facility (BSF)

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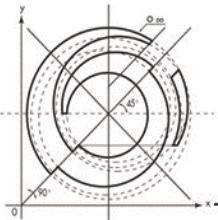
- Large-pilot scale, utility boiler design combustion test facility
- Models hopper coutant through economizer region
- 60 MMBtu/hr (17.5 MWt) firing rate
- Coal, oil, or natural gas capable
- Tangential or wall fired operating modes
- Used for the development of ALSTOM Power's TFS 2000™ Firing System



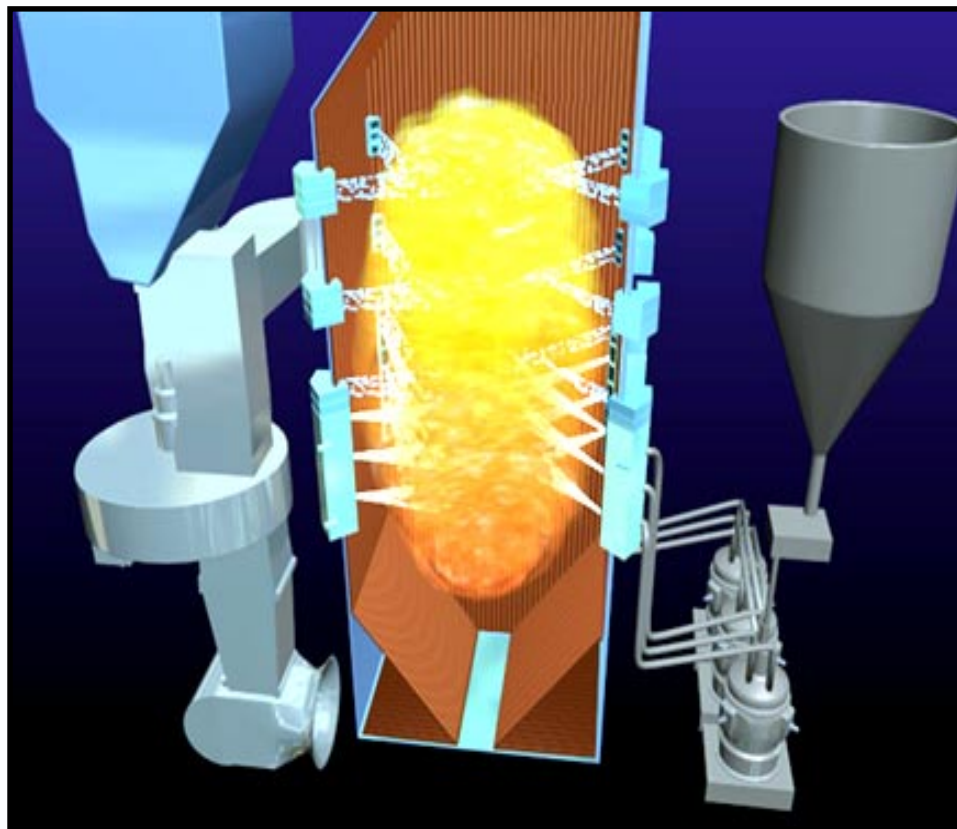
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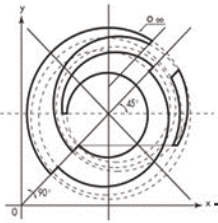
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# TFS 2000™ Firing System

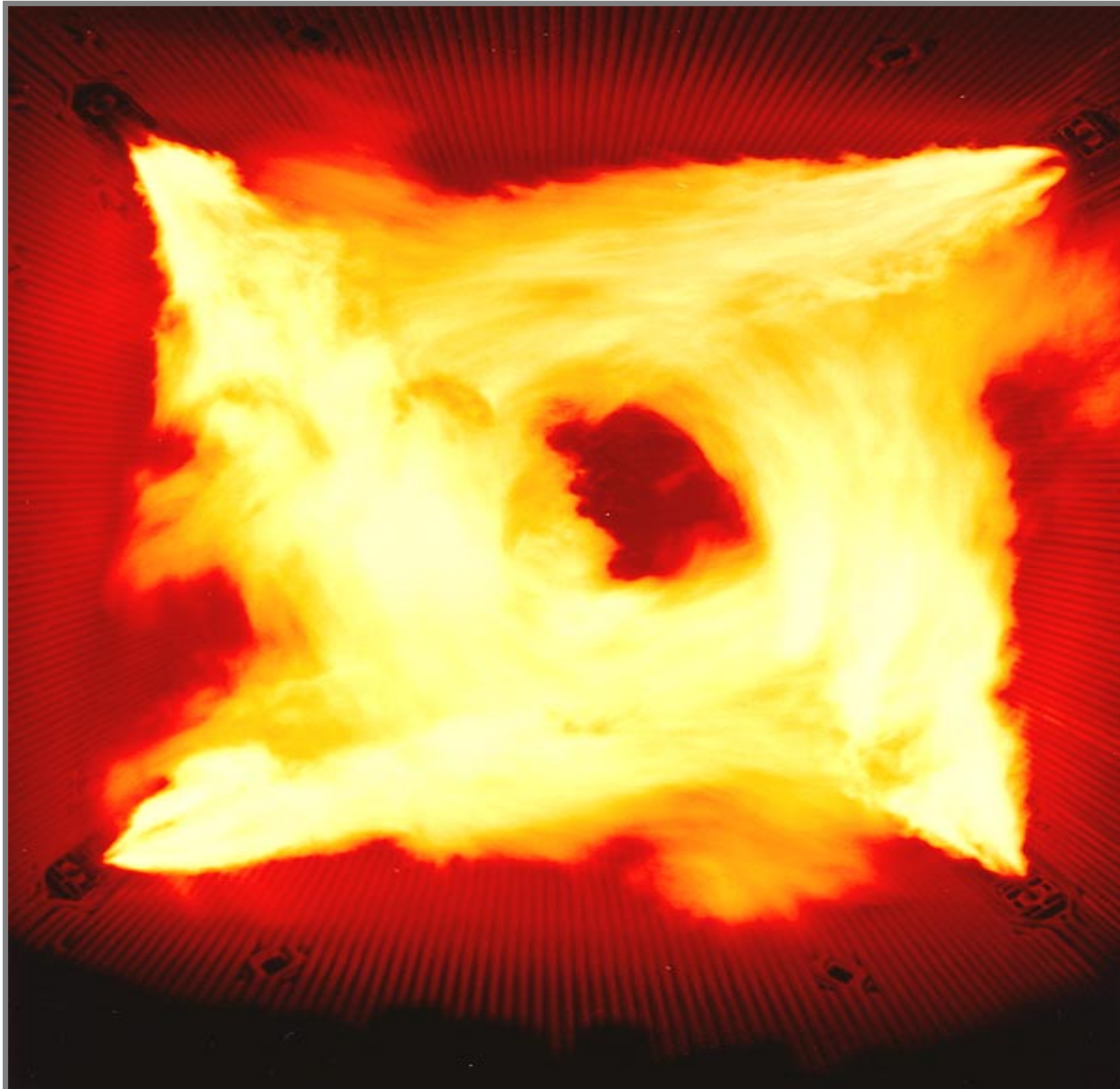


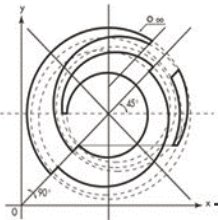
- **Features Include:**
  - Flame Attachment Coal Nozzle Tips
  - Concentric Firing System (CFS™) Nozzles
  - Close-Coupled Overfire Air
  - Multi-level Separated Overfire Air
  - Dynamic™ Classifiers
- **Field Performance:**
  - < 0.25 lb/MMBtu firing Eastern bit. coal
  - < 0.15 lb/MMBtu firing Western subbit. coal



# Typical Flame Pattern of a Tangential Firing System

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# BSF Test Results - NO<sub>x</sub>

